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Phylogeny of adaptive immunity in jawless vertebrates

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Abstract

The requirement of self-defense in the ongoing struggle for survival led to the evolution of complex immune systems. About 500 million years ago two types of adaptive immune systems (AIS) arose in vertebrates which featured migratory populations of lymphocytes that express a diverse repertoire of recognition receptors. Jawed vertebrates somatically diversify the repertoire of immunoglobulin-domain based B and T cell antigen receptors through the rearrangement of V(D)J gene segments and somatic hypermutation, whereas an alternative AIS of jawless vartibrates (lamprey and hagfish) is based on variable lymphocyte receptors (VLRs) which diversify through recombinatorial usage of leucine-rich repeat (LRR) cassettes in *VLR* assembly. Three *VLR* genes have been identified; the *VLRB* gene is expressed by B-like lymphocytes, while *VLRA* and *VLRC* are expressed by two different lineages of T-like cells which in some ways resemble thymus-derived αβ and γδ T cells lymphocytes of jawed vertebrates. Analysis of the genomic organization of *VLRA*/*VLRC* has revealed shared usage of genomic donor cassettes during *VLRA* and *VLRC* assembly somewhat analogous to the shared usage of variable gene segments during *TCRA*/*TCRD* locus rearrangement in jawed vertebrates. The recent availability of the lamprey genome sequence may contribute to the reconstruction of VLR phylogeny and insight into how the adaptive immune function evolved in the context of well developed innate immunity.

Biography

Sabyasachi Das has completed his Ph.D from Jadavpur University, India and postdoctoral studies from Pennsylvania State University, USA. His current research interest is the evolution of adaptive immune system and immunity. He has published more than 25 papers in reputed journals and serving as an editorial board member of repute.